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The invention relates to a method to the production of properly matching and surface-precisely into one another addable Karosseriebauteile in accordance with the preamble of the claim 1.

With the present production of vehicle bodies the individual components become because of the special passport accuracies increased formed as "integral construction units". An integral construction unit is for example a side wall, which becomes all door mass included and from the door the entire door opening up to the sheet metal sections cut, necessary later before the deep-drawing procedure in the range, for holding down with the deep drawing. The pieces of sheet metal cut out at the location of the future door of the side wall thereby the scrap supplied become. After the pressing operation the door frame is again cut, whereby additional blend results. Subsequent ones become the reinforcement parts of single at door and at the side wall in the door area situation-fairly mounted. Due to the variety of the described single steps to the formation of the body construction units and the significant Ant at resulting scrap, which amounts to about 50% of the untrimmed starting material, the known manufacturing method is very expensive and time-intensive. The other it is to be co-ordinated the technically very expensive door mass for an exact register accuracy with the door opening of the side wall and to the other problematic deep-draw-technical with the transformation the trim range of the side wall to the one.

A gattungsgemäßes method is known from the DE 34 29 092 A1.

The invention is the basis the object, would genericin accordance with-eat methods going by to develop further that the technical effort and the costs become the production of the body construction units bottom guarantee of an exact register accuracy of the into one another addable body construction units reduced.

The object is according to invention by the characterizing features dissolved indicated in the claim 1.

The advantages of the requirement-in accordance with-eaten embodiment of the manufacturing process lie in it that by the common transformation of the outer parts of the into one another addable body construction units and ripping late the one which can be fit out in from with this still continuous ambient component, only taking place to the conclusion, on the one hand the blend portion of substantially reduced resulting in prior manufacturing

processes will and that on the other hand become achieved by ripping the component out which can be fit in properly matching interfaces between both components, the reworks of only small periphery for a late fitting in require. It becomes by scrap iron avoidance thus in larger periphery material saved and thus the costs which can be applied for it during the material procurement. Further the recycling amount and the costs connected thereby become reduced. For the transformation of the body construction units only a single depth tool becomes required, which the production simplified as well as their effort, time and costs significantly reduced. Furthermore this becomes very simplified that the attachment range of the ambient body construction unit, thus, whose design for an ambient body construction unit cut to the formation of the fitting in opening before with the deep drawing transform-technical difficult is planned for the reinforcement part, does not have to become according to invention considered with the deep drawing. Finally the manufacturing costs of the body construction units become substantially reduced due to the achieved procedure economics.

Convenient aspects of the invention can become the Unteransprüchen removed; in all other respects the invention is subsequent more near explained on the basis an embodiment represented in the designs; shows:

Fig. 1 schematic in the cross section with reinforcement parts provided and after the invention process a made side wall of a motor vehicle in untrimmed state and a Trennstation for ripping a door out after the invention process,

Fig. 2 schematic in the cross section the side wall and the door from Fig. 1 after the separation process.

In Fig. 1 is a portion of a side wall 1 of a body of a motor vehicle shown. In the side wall 1 a door 3 is still unseparated integrated. , The continuous outer skin parts of 2 of the side wall 1 and the door 3 existing from a lightweight construction material or a steel are by deep drawing concerning its surface contour and outlining outline outline-fairly, in the cross section essentially u-shaped, formed.

At the inside 4 of the outer skin parts of 2 the interior skin parts are 5 fixed. The ripped out door of 3 serving interior skin parts of 5 late to the stiffener of the side wall 1 and that contain a door case 6 and one of these separate door interior frameworks 7 (Fig. 2). The outer skin parts of 2 and the interior skin parts of 5 consist of weldable materials, for example aluminium or steel.

To the production of the into one another addable body construction units, which becomes door 3 and the side wall 1, this common and simultaneous from an unitary planar circuit board - with a metal body for example a sheet-steel plate - with one the later fitting in situation corresponding relative position punched, wob the sheet-steel plate at the edge of a blank holder at the deep-drawing stencil held and by application by a deep-drawing stamp

the u-shaped contour of the outer skin parts of 2 formed becomes.

The two different reinforcement parts of 6, 7 must become not necessarily single manufactured and become adjacent. So likewise a contactless topographical mounting conceivable same like a deep drawing of both reinforcement parts 6, 7 common and simultaneous relative position corresponding from an unitary circuit board with one the later fitting in situation is. With the production of the reinforcement parts of 6, 7 from a circuit board later joints become an exact accordance of the layer of the parts 6, 7 one on the other achieved and equally undesirable manufacturing tolerance-conditional unevenness during single production, by the more inaccurate situation tuning of the parts 6, 7 and thereby a worse quality of workmanship arise if necessary, avoided the one with. On the other hand become saved, whereby the manufacturing costs of the body construction units become 1, thereby an additional production line and additional work procedures, 3 reduced.

The reinforcement parts, door case 6 and door interior framework 7, are here in the ground state as integral mould part 26 with a wall thickness  $s_2$  formed. The topographical mounting of the mould part 26 at from the sheet-steel plate corresponding the desired shape of the body construction units 1, 3 and in accordance with their fitting in situation outline-fairly punched outer skin parts of 2 made by welding, preferably by laser welding, electron-beam welding or a cognate welding method, whereby the mould part 26 with a parallel side 38 longitudinal to the reason 9 of the outer skin parts of 2 rests against this. By be void the adding procedure of separated reinforcement parts together and at the outer skin parts of 2 with the use of an integral mould part 26 becomes an other work procedure saved and the designed inexpensive thus the production simplified and.

The separation of the door 3 from the side wall 1 the outside and interior skin parts of 2, 5 in a Trennstation 27 between one become the corresponding mould part 26 formed break forming stencil 28, which the mould part 26 rests upon flat and pushes away, and a blank holder 29, that those the mould part 26 opposite side 30 of the punched outer skin parts of 2 pressing applied, clamped after the weld. Blank holder 29 and break forming stencil 28 are thereby with in each case the later gap 31 (Fig. 2) provide 1 process-moderate corresponding, however in the width around at least the double of the sum of the wall thicknesses  $s_2$ ,  $s_1$  von Formteil 26 and outer skin parts of 2 larger gap 32, 33 between the door 3 and the side wall, who are in the range of the gap 31 disposed congruently one above the other.

During the separation process will thereby outline cuts from the compressor rod side from a break forming stamp 34 with a central separation point 35 by outside and interior skin parts through of 2, 5 and into the gap 33 of the break forming stencil 28 pushed, led in the gap 32 of the blank holder 29, becomes. This can take place also after type of pulling through via a knife diving in transverse to the outer skin into the material situations. The first effected separation point 35 an elongation of the sheet metal material group, whereby following of the neighbour ranges of the interface 29 prevented by the restraint over the blank holder becomes, and simultaneous by its sharpness a notch, which leads to the target break of the

material group and thus to the formation of cut edges 41. Afterwards with the separation on sides of the door 3 and on sides of the side wall 1 resultant projections 36 of the outside and interior skin parts of 2, 5, thus those new developed, are break formed together bordering edges of workpiece, by the immersion of the break forming stamp 34 into the gap 33 of the break forming stencil 28 over their peripheral edges 40 in 90 DEG - to direction. In addition a dimensioning of the gap is 32, 33 required, into the additional to the double sum of the wall thicknesses  $s_1$ ,  $s_2$  von Innen- und Aussenhautteile of 5, 2 still the thickness of the stamp shank 37 in the immersing range of the gap 33 is included. The width of the resultant gap 31 between door 3 and side wall 1 corresponds thus to the mentioned thickness of the stamp shank 37.

Both when welding outside and inner shell 2, 5 on door and side panel side generated weld seams 39 lie concerning gap 33 break forming stencil 28 in such a manner of their peripheral edge 40 carried back that the weld seams 39 after the bent section, achieved with which in the edge area of the gap 33 quasi as with the deep drawing flowing of sheet material into the gap becomes 33 inside straight still because of the peripheral edge 40 immediate outside of the break formed projections 36 and to be. Thus the weld seams 39 break-susceptible in relation to a so high bending load by the break forming stamp 34 remain undisturbed outside of the Durchstellbereichen and thus by a stamp admission, so that the strength of the weld seams is 39 ensured and thus the fixed Schweissverbund of the trays 2, 5 secured. In addition then the weld seams 39 lie outside of the visibility, so that the seams 39 after the dipping lacquer finish of the carcass body the ausgesteiften and cut outer skin parts of 2 on their surface contour optical no longer are more perceptible.

The combination of this separation process through-placing and if necessary subsequent with the use of weldable materials for interior and outer skin parts of 5, 2 a possible separation of the body construction units including the formation of the gap 31 between these in a single unitary separation process, abstreckenden for an extension of the break formed projections 35. The scrap iron portion becomes with the production of the body construction units other reduced and simultaneous semi-finished material saved by is void a separate separate sheet metal group strip to the formation of the door gap 31. The assembly of the parts 2, 5 and the separation of the body construction units with defined gap 31 for the movement joints of the doors 3 made with an extremely high register accuracy. Besides 36 outward standing sharp edges of the body construction units in mounted state, 1 integrated with which the door is 3 into the side wall, become - whole same in which swiveling position of the door 3 by bending of the projections which is made by the bent section - avoided.

Final one becomes then the door 3 at the side wall 1 properly matching mounted.